

WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

a first MOSFET designed to have a threshold level which is relatively lower, the first MOSFET having a first gate oxide film;

a second MOSFET of an n-type designed to have a threshold level which is relatively higher, the second MOSFET having a second gate oxide film thicker than the first gate oxide film; and

a third MOSFET of a p-type designed to have a threshold level which is relatively higher, the third MOSFET having a third gate oxide film which is thicker than the first gate oxide film and is thinner than the second gate oxide film.

2. A semiconductor device as claimed in claim 1, wherein the second and third MOSFETs cooperate with each other and form a complementary MOS circuitry.

3. A method for fabricating on a semiconductor substrate a semiconductor device as claimed in claim 1, the method comprising:

forming an isolation region within the semiconductor substrate and close to a surface of the semiconductor substrate to define a first region for the first MOSFET and a second region for the second and third MOSFETs;

selectively implanting fluorine ions into a first part of the second region with a first ion-implantation condition, the first part of the second region being for the second MOSFET, the first ion-implantation condition being determined to form the second gate oxide film;

selectively implanting fluorine ions into a second part of the second region with a second ion-implantation condition, the second part of the second region being for the third MOSFET, the second ion-implantation condition being determined to form the third gate oxide film;

simultaneously growing oxide films on and over the first and second regions of the semiconductor substrate; and

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forming the first to third MOSFETs by using the simultaneously grown oxide films, so that the first to third MOSFETs have the first to third gate oxide films, respectively.

4. A fabricating method as claimed in claim 3, wherein the first and second ion-implantation conditions are determined so that the third gate oxide film is thinner than the second gate oxide film.

5. A fabricating method as claimed in claim 4, wherein the first ion-implantation condition comprises first dosage of fluorine ions and predetermined implantation energy, while the second ion-implantation condition comprises second dosage of fluorine ions and the predetermined implantation energy, the second dosage being less than the first dosage.

6. A fabricating method as claimed in claim 5, wherein the first dosage is of 7.0×10^{14} - $1.2 \times 10^{15}/\text{cm}^2$ inclusive, and the predetermined implantation energy is 5keV.

7. A fabricating method as claimed in claim 6, wherein the second dosage is equal to or below $6.0 \times 10^{14}/\text{cm}^2$.

8. A fabricating method as claimed in claim 4, wherein the first ion-implantation condition comprises predetermined dosage of fluorine ions and first implantation energy, while the second ion-implantation condition comprises the predetermined dosage of fluorine ions and second implantation energy, the second implantation energy being higher than the first implantation energy.

9. A fabricating method as claimed in claim 8, wherein the predetermined dosage is $6.0 \times 10^{14}/\text{cm}^2$, and the first and second implantation energies are 3keV and 5keV, respectively.

10. A fabricating method as claimed in claim 4, wherein the first and second ion-implantation conditions are further determined so that the second and third MOSFETs have gate-channel leakage current characteristics substantially equal to each other.

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11. A fabricating method as claimed in claim 10, wherein the first and second ion-implantation conditions are further determined so that standby current in the second and third MOSFETs do not depend on the gate-channel leakage current characteristics but on subthreshold characteristics of the second and third MOSFETs.

12. A fabricating method as claimed in claim 3, further comprising:

before the selectively implanting fluorine ions into the first part of the second region, forming P-well as the first part within the second region; and

before the selectively implanting fluorine ions into the second part of the second region, forming N-well as the second part within the second region.

13. A fabricating method as claimed in claim 12, wherein the forming P-well is carried out by selectively implanting boron ions into a part of the second region that becomes the first part.

14. A fabricating method as claimed in claim 12, wherein the forming N-well is carried out by selectively implanting phosphorus ions into a part of the second region that becomes the second part.

15. A fabrication method as claimed in claim 3, wherein the forming the isolation region is carried out in LOCOS (Local Oxidation on Substrate) process.

16. A fabricating method as claimed in claim 3, wherein the forming the isolation region is carried out in STI (Shallow Trench Isolation) process.

17. A fabricating method as claimed in claim 3, wherein the simultaneously growing oxide films is carried out in single thermal oxidation process.